IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Ilkka Kojo

Application No: 10/585,293

Filed: April 14, 2009

For: SUPPLY SYSTEM FOR SUSPENSION SMELTING FURNACE

Confirmation No: 2363

Art Unit: 1733

Examiner: MICHAEL ABOAGYE

Docket: OUTT.3501

DECLARATION OF ILKKA KOJO

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

I, Ilkka Kojo, declare as follows:

1. I was awarded the degree of M. Sc. by Helsinki University of Technology in 1981 (Thesis: Effect of Alkalis on the Blast Furnace Coke), the degree of Lic. Tech. (Licentiate in Technology) by Helsinki University of Technology in 1983 (Thesis: The Thermodynamics of As and Sb in the Soda Slag Fire Refining of Copper) and the degree of D. Sc. by Helsinki University of Technology in 1985 (Thesis: The Thermodynamics of As, Sb, Cu, Bi, Pb, Ni, Se, Te and Sn in the Fire Refining of Copper by Sodium Carbonate Slag). I have more than 25 years of experience in research and technology development in both high-temperature metallurgy and hydrometallurgy. I have been employed by Outotec Oyj as Vice President, Research and Technology Development and my current position in Outotec Oyj is Director, Environment and Sustainability. Based on my education and experience, I am an expert on the subjects to which this declaration relates.

2. I am the inventor of the subject matter disclosed and claimed in US Patent Application Number 10/585,293 filed April 14, 2009 and I am familiar with the content of

that patent application. U.S. Patent Application Number 10/585,293 is currently assigned to Outotec Oyj. I have no interest in the outcome of the patent application that is different from that of any other employee of Outotec Oyj.

3. I am familiar with the disclosure in US Patent No. 6,001,148 (Okamoto et al).

4. I am familiar with the level of knowledge and expertise of persons of ordinary skill in the art of extractive metallurgy.

5. Smelting is a form of extractive metallurgy. The main use of smelting is to produce molten metal or metal-containing intermediate product from ore or concentrate. One known type of smelting is suspension smelting, in which matte and oxide slag are produced from concentrate containing sulfur and iron. Suspension smelting is commonly used to extract copper from concentrate, but suspension smelting may also be used to extract other metals.

6. A typical suspension smelting furnace comprises a vertical reaction shaft to the top of which the concentrate and air or other oxygen-containing gas are supplied, a settler below the reaction shaft for collecting molten droplets that have been formed by smelting the concentrate in gaseous suspension, and an uptake shaft leading upward from the settler for removing waste gas and flue dust. The uptake shaft is generally spaced horizontally from the reaction shaft. In suspension smelting, the heat needed to smelt the concentrate is generated mainly by the exothermic reactions of sulfur and/or iron contained in the concentrate with oxygen contained in the gas that is supplied to the suspension smelting furnace with the concentrate. The heat generated by the exothermic reactions is enough to melt the products, which are normally copper matte and oxide slag.

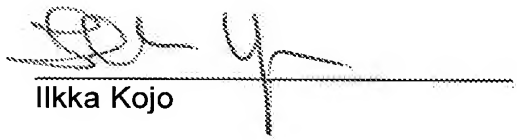
7. Okamoto et al discloses a process for obtaining iron from iron ore by supplying the iron ore and coke to a burner 12 having a nozzle 14 for receiving heavy fuel oil as fuel and also having a nozzle 16 for primary oxygen. The oxygen reacts with the heavy oil (or other fossil fuel) to generate heat to support the highly endothermic

reduction reaction by which the coke reduces the iron oxide to form ore, which is collected in the molten bath at the bottom of the furnace. The iron ore and coke are supplied to the burner as powder using air as a carrier gas. The coke both serves as a reducing agent for the iron ore and supplements the heavy oil as a fuel to generate heat to support the endothermic reduction reactions.

8. In my opinion, a person of ordinary skill in the art of extractive metallurgy would not consider that the process disclosed by Okamoto et al is suspension smelting, as that term is understood by persons of ordinary skill in the art, because the oxygen that is supplied to the furnace (both to support combustion of the heavy oil and as a component of the air used to convey the iron ore and coke to the burner) does not react exothermically with the iron ore to release heat required to smelt the iron ore. In fact, because of oxide raw material, the technique of suspension smelting (as that term is understood by those skilled in the art of extractive metallurgy) cannot be applied to extraction of iron from an iron concentrate.

9. In my opinion, a person of ordinary skill in the art of extractive metallurgy would consider that the drawings of Okamoto et al, particularly FIGS. 1, 3, 4 and 5 are highly schematic and are not intended to depict realistically the relative locations of the components shown in the drawings. On the contrary, a person of ordinary skill in the art would recognize that the positioning of components shown in FIGS. 1, 3, 4 and 5 is dictated by convenience and the need to show components within the sight area of the drawings. Specifically, although the paragraphs starting at column 4, lines 17 and 55 of Okamoto et al refer to air as the carrier gas for the iron ore powder, it does not follow that the iron ore particles are lifted from a lower elevation to a higher elevation by the air flow. Noting that Table 2 of Okamoto et al refers to the pulverized iron ore being supplied at a rate of 2.8 T/hour (over 6,000 lbs/hour), in my opinion air supplied at a rate of 100 Nm^3/hour as carrier gas would not be sufficient to lift the iron ore particles to any significant degree.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

By: 
Ilkka Kojo

Dated: Espoo 10th October, 2011